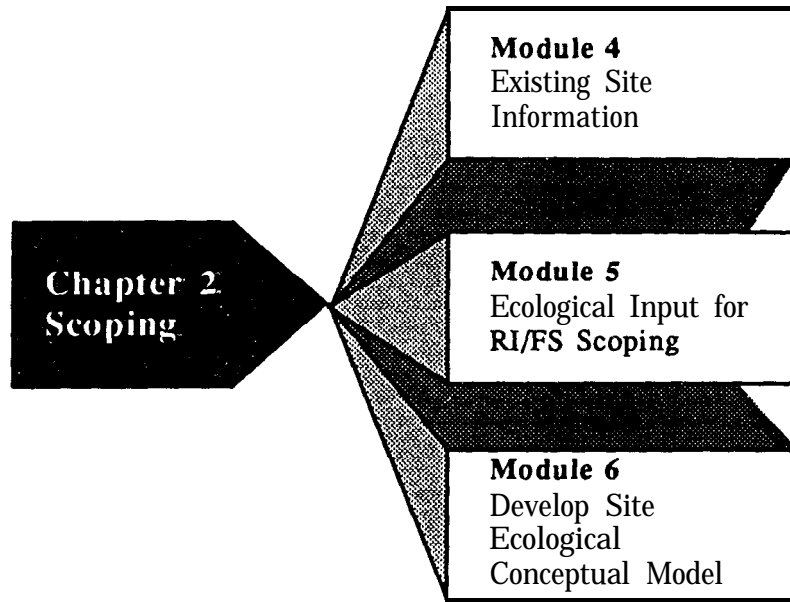


CHAPTER 2

Scoping



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CHAPTER 2: SCOPING

Scoping activities involve collection and analysis of existing site information and development of a site ecological model that is consistent with and refines the conceptual site model. The conceptual site model should include known and suspected sources of contamination, contaminant types and media affected by each, known and potential routes of migration, and known or potential human and environmental receptors (EPA 1988a).

The **scoping** process should help (1) identify the kinds of remedial decisions that site managers need to make, (2) determine the types of ecological investigations needed to support decision-making, and (3) design field and/or laboratory studies for collecting those data (EPA 1991b).

Existing ecological information may be insufficient to allow establishment of project goals or to identify important species or groups likely to be affected by hazardous substances. Limited field investigations should be undertaken in this case. EPA (1988a) guidance on scoping indicates that existing ecological information should be examined for the following topics:

- Location of any threatened, endangered, or rare species, sensitive environmental areas, or critical habitats on or near the site;
- Common flora and fauna of the site and surrounding areas; this information will provide an understanding of the most common species likely to be exposed to hazardous substances and the potential effects of other species through biomagnification; and
- Available results from any previous biological testing, such as data on acute or chronic toxicity or bioaccumulation. Literature searches to identify pertinent studies on the hazardous substances known to occur at the site will be useful for determining whether future field or laboratory tests might be required.

In addition, the project ecologist and ERPM can use any available past ecosystem modelling results or a geographic information system to display existing data and scope the extent of future studies to be described in the ecological work plan. The EPA framework steps (EPA 1992a) for ecological risk assessment will help to focus on the type of ecological data needed for determining risk of implementing various remedial action alternatives.

Ecological input may also be obtained during the community relations/public participation activities carried out as part of scoping. Activities the DOE must undertake in carrying out its community relations requirements at the CERCLA site are defined in the NCP [40 CFR Part 300.430(c)].

The evaluation of existing site information in Module 4 is intended to identify deficiencies in data needed to fully characterize the site physical features (see Module 7) and to assist ecologists and the ERPM in developing a site conceptual model. The ERPM is expected to rely mostly on existing site information during the scoping phase. Limited ecological field investigations would be conducted only if needed to develop the site conceptual model.

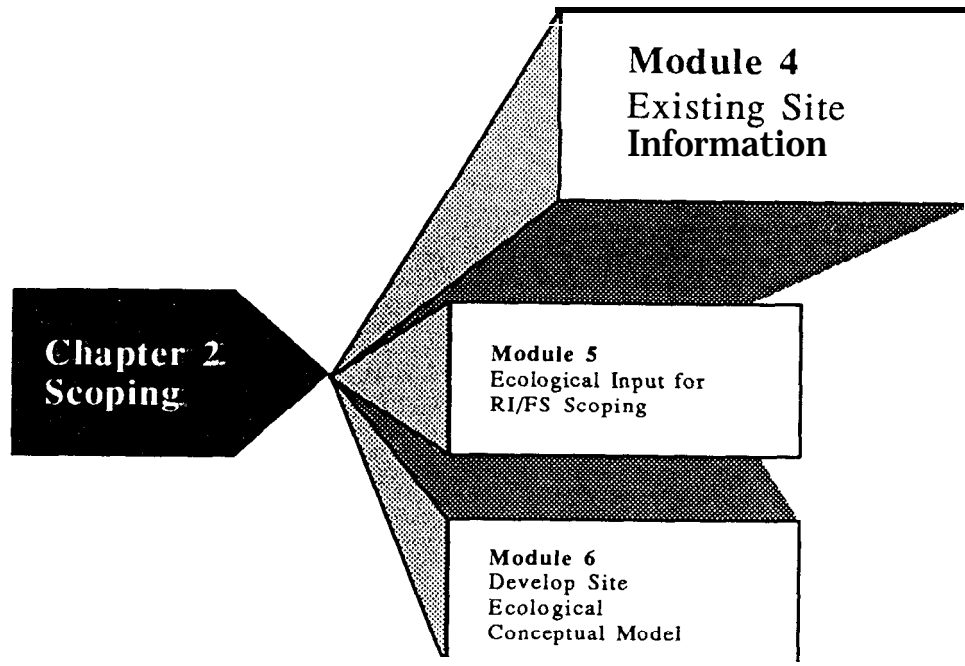
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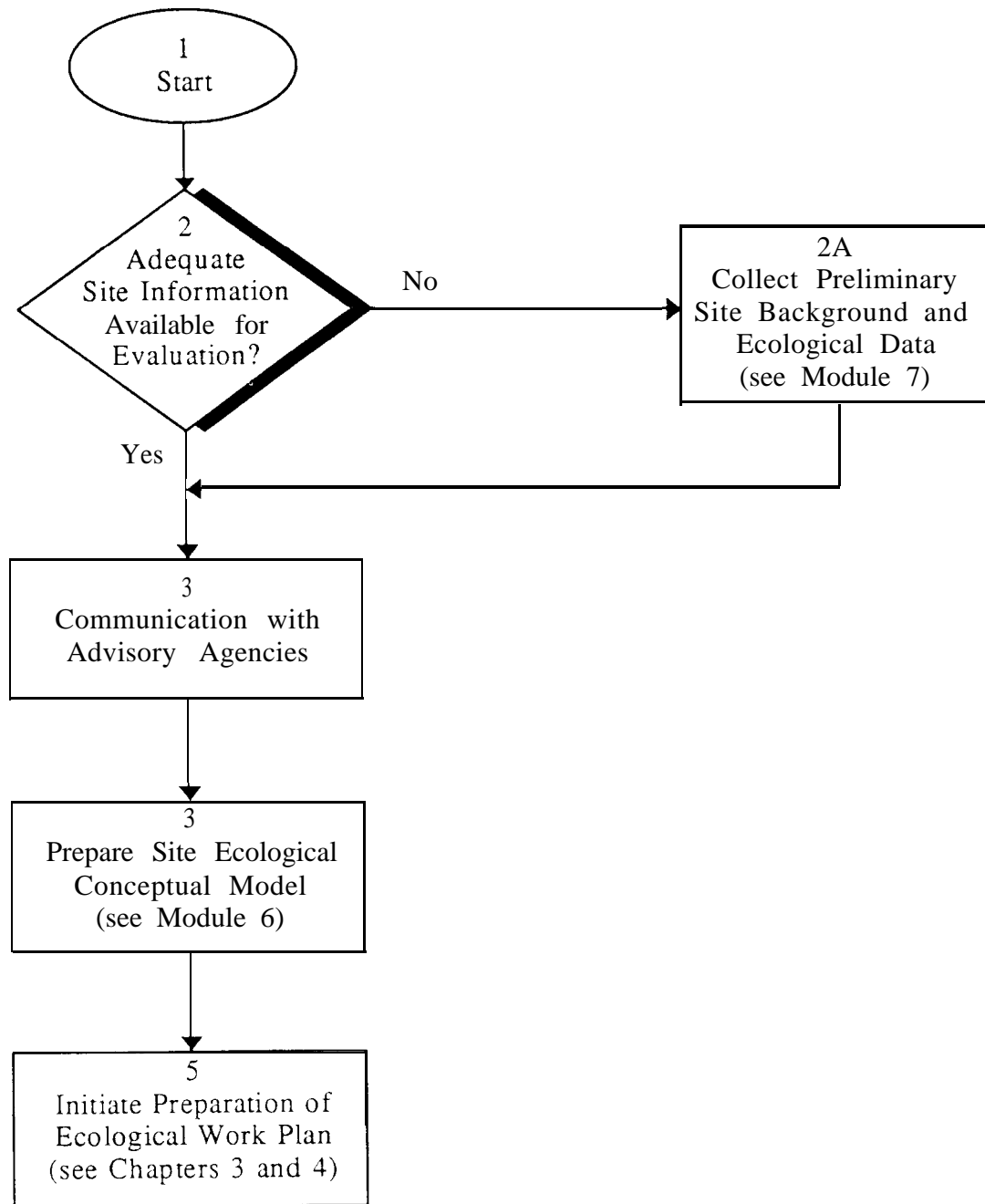
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MODULE 4:
EXISTING SITE INFORMATION



Module 4: Existing Site Information



MODULE 4: EXISTING SITE INFORMATION

Step 1 Start.

Step 2 Program goals and objectives should be considered at the outset of scoping. Information on the site should be assembled for review by technical managers and the ERPM. Information should include results from any past removal actions or remedial activities, site preliminary assessment, site inspections, the National Priorities List (NPL) listing process, and results of previous characterization or scientific research conducted on the site (ORNL 1933) (see **Appendix A, Section A.1.1**)

Existing Information

Available site information can be used to develop an initial awareness of site conditions and problems and to determine additional information that may be required to make technically defensible decisions about remedial action alternatives. Maximizing the use of available site information will help to avoid duplication of previous data collection efforts and help to focus data collection efforts required for the ecological assessment.

Step 2a The DOE ERPM will collect and evaluate existing ecological data and information on site physical features that is adequate to provide background information for interacting with advisory groups or state and federal agencies. Site descriptive information should be compiled on location, ownership, topography, geology, and use, waste types, and estimates of waste volumes. Existing site data can be obtained from a variety of reports (e.g., state publications or federal government reports of studies on ecological resources at the site or similar ecosystems in the site vicinity), other operable units, databases, and similar sources (see **Appendix A, Section A.1.3**). Limited field sampling may also be necessary.

Step 3 Meetings with advisory agencies or groups (e.g., BTAG) will facilitate identification of procedures and appropriate sequence of actions DOE should follow to address site problems, particularly for filling data gaps. Such procedures are needed to assure that DOE meets overall data quality objectives in the RI/FS process (see **Appendix A, Section A.3**).

RI/FS alternatives development cannot be initiated by DOE until site information has been reviewed and input from advisory groups and agencies has been evaluated.

Step 4 Site conceptual models can be developed once DOE and advisory groups and agencies evaluate existing information (see Module 6 for detailed guidance on the preparation of site ecological conceptual models). The use of existing information is essential for developing the preliminary ecological conceptual model. The model

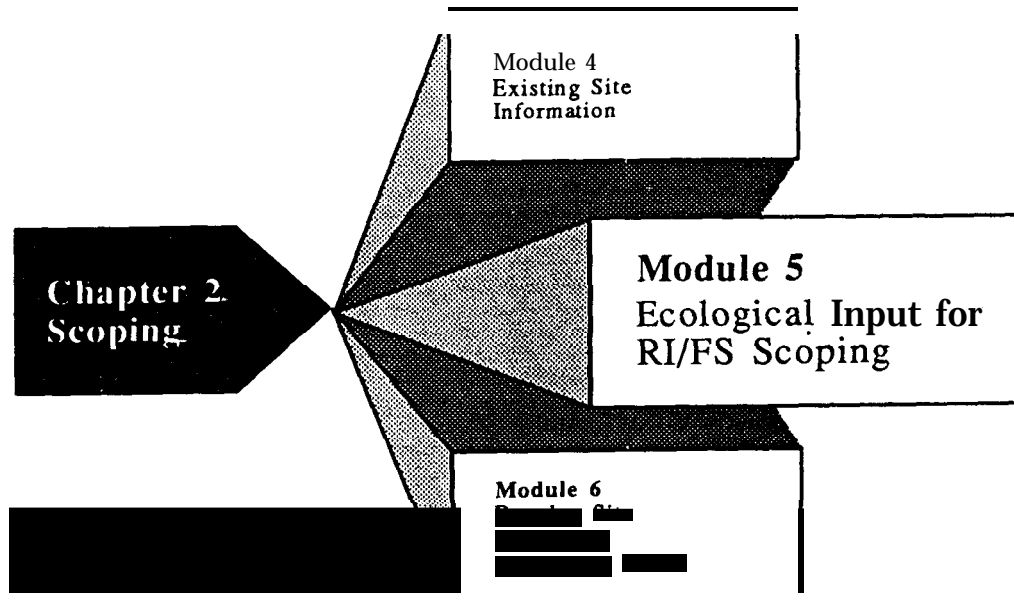
will be refined in an iterative manner as detailed information is obtained on site physical features and potential contaminant pathways (see Modules 7 and 8).

- Step 5 The DOE ERPM should assemble scientific and engineering data in one location (e.g., project library) to assist managers faced with basic questions on remedial action alternatives design. These data will help to define additional laboratory and field data collection to be described in the ecological work plan.

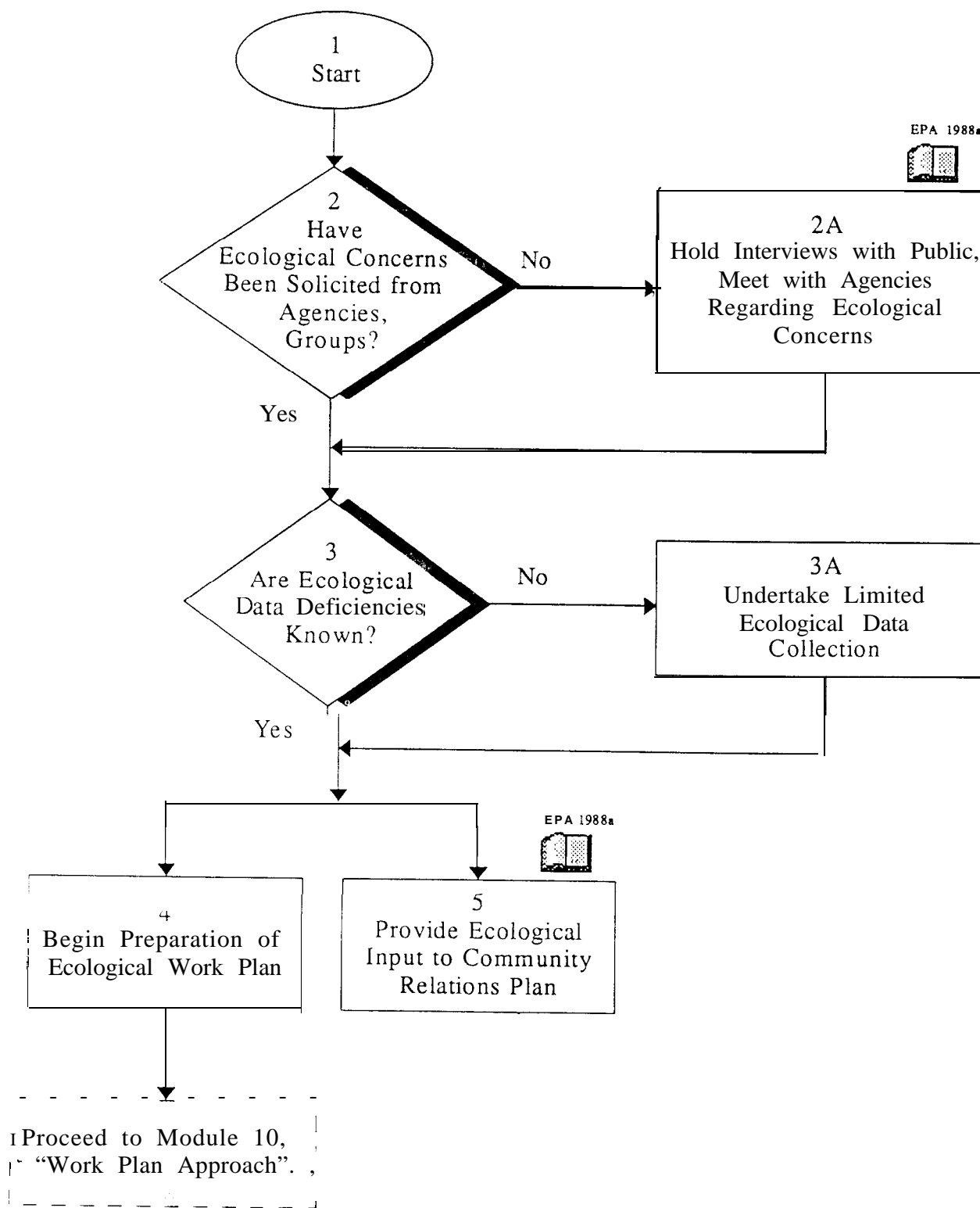
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MODULE 5:
ECOLOGICAL INPUT FOR RI/FS SCOPING



Module 5: Ecological Input for RI/FS Scoping



MODULE 5: ECOLOGICAL INPUT FOR RI/FS SCOPING

Step 1 Start.

Step 2, 2a Part 300.430(b) of the NCP provides guidance on RI/FS scoping. A detailed diagram of the scoping process is presented in Figure 2-1 of earlier EPA (1988a) guidance. Project ecologists should contact appropriate professionals of federal and state agencies with special knowledge of or legal responsibility for ecological resources. Regional offices of the EPA, the FWS, and state agencies also can provide information on groups or individuals with special interest or technical expertise with respect to biological resources in the area.

Step 3, 3a A determination by professional ecologists on the adequacy of existing ecological information should be made early in the RI/FS scoping process. Appropriate field data collection may be warranted to adequately characterize the site. The intended use of ecological data will dictate the number of data samples collected, sample location, and species sampled. In many cases professional judgment will be necessary to determine ecological data needs when no previous site-specific data are available.

Preliminary studies to identify and specify ecological assessment objectives include site visits, examination of aerial or satellite photographs, evaluation of information from local experts, and limited ecological data collection. Preliminary studies may reveal potential exposure pathways, receptors, and previously unobserved toxic effects or site habitats (EPA 1989c, 1992a).

Once preliminary ecological data have been collected, the ecologists responsible for developing the ecological work plan may want to discuss findings with EPA biologists and members of the BTAG to obtain input beneficial to the ecological risk assessment process. The BTAG may help determine target species to be evaluated and data needs for the risk assessment (**see Appendix A, Section A.3**).

Step 4 Planning for detailed ecological data requirements to be defined in the site ecological work plan should be initiated at this stage. The DOE ERPM and project ecologists should contact state and federal agencies having responsibility for implementing project ARARs, to identify additional ecological data needed to characterize the existing site.

- Step 5** Determine from interviews what ecological resources that public groups and individual members of the general public feel are important and should be identified in the community relations plan (EPA 1988a). Recreational species (e.g., important game fish and wildlife species commonly hunted) will often be of interest to the public and special interest groups.

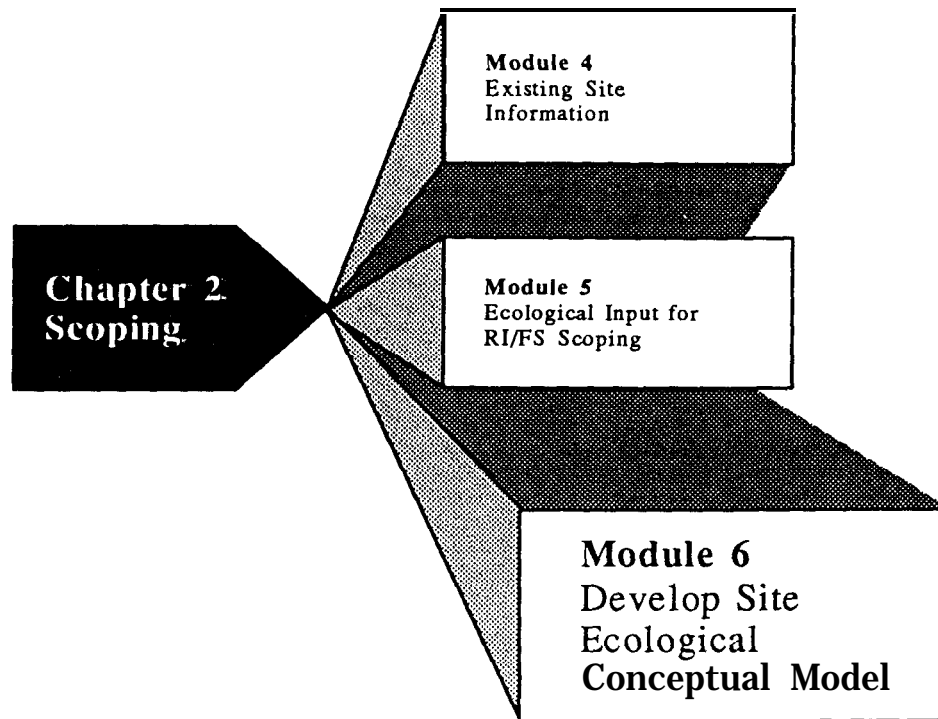
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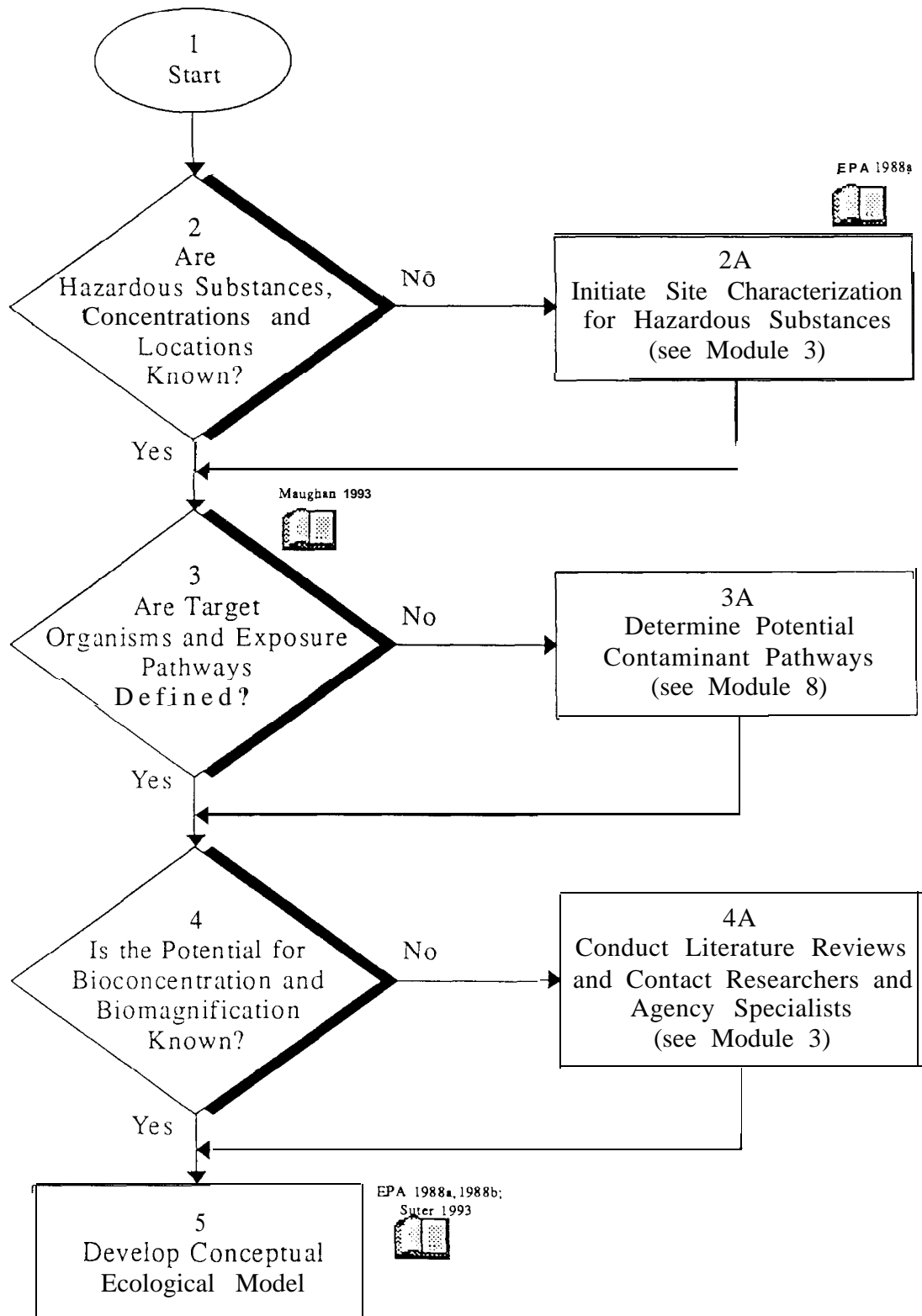
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MODULE 6:
DEVELOP SITE ECOLOGICAL CONCEPTUAL MODEL



Module 6: Develop Site Ecological Conceptual Model



MODULE 6: DEVELOP SITE ECOLOGICAL CONCEPTUAL MODEL

Step 1 Start.

Step 2, 2a A conceptual site model should be developed by project engineering and environmental staff on the basis of information obtained pursuant to NCP Part 300.430 b(1). The DOE CERCLA environmental reference book includes the NCP regulations that pertain to site characterization and data needs for developing a site conceptual model (ORNL 1993). Preliminary information on hazardous substances present at the site must be known. Additionally, the locations and concentrations of hazardous substances at the site must be generally understood to proceed with the development of a site conceptual model. If this information is not known, Steps 2a and 3a of Module 3 will need to be undertaken.

Step 3, 3a Ecological data should be adequate to define target organisms and exposure pathways through the various trophic levels. An exposure pathway is the link between a contaminant source and a receptor (EPA 1991b). If this information is not known, Steps 3 through 5 of Module 8 will need to be undertaken.

In cases where site-specific ecological data are unavailable for the contaminants and habitat/community types in question, comparable sites with the same or similar contaminants can be used in

developing the model. The appropriateness of using ecological data from supposedly comparable sites can be a major point of disagreement among ecologists and engineers or project administrators and among DOE, the EPA, and state reviewers faced with making project decisions in a timely, efficient manner.

Receptor species or target organisms include: (1) species considered essential to, or indicative of, healthy functioning of habitats (e.g., stream invertebrates); (2) rare, endangered, or threatened species on or near the site; and (3) species protected under federal or state law (e.g., Migratory Bird Treaty Act, Marine Mammal Protection Act) (EPA 1991b). Receptor species may also be chosen to represent a particular guild (i.e., group of organisms with similar habitat and/or feeding requirements). For example, a common shrew species could be selected as a representative of small, insectivorous mammals.

Step 4, 4a Determinations of the potential for bioconcentration and biomagnification within the ecological resources of the site can be made on the basis of literature and site-specific laboratory and field testing of the target organisms in question (see **Appendix A, Sections k3.4 and A.4.1.4**). In some cases, little (if any)

data may exist on contaminant effects to the target species, necessitating the use of data on similar or related species. Refer also to Step 4a of Module 3.

Step 5

The purpose of the conceptual site model is to focus the RI/F'S process and to provide a basis for the initial risk assessment (i.e., baseline risk assessment). A conceptual ecological model should be developed on the basis of assumptions of current source of media contamination (e.g., soils and sediments), release mechanisms (e.g., groundwater, surface **runoff**), environmental **transport** medium (e.g., direct

Site Conceptual Model includes source-pathway-receptor diagrams and descriptive text. It helps to define and describe the following: (1) nature and extent of contamination; (2) physical setting of the site; (3) geology, hydrology, and geochemistry; (4) fate and transport mechanisms; (5) contaminant pathways, and (6) receptors.

contact, air, groundwater, surface water), and potential exposure routes (i.e., ingestion, inhalation, **and/or** dermal contact) to biotic receptors. Figure 6.1 depicts a simplified conceptual site ecological model diagram that would be applicable to a contaminated waste site. The conceptual model could become more complex depending on types and extent of habitats that are contaminated and as the "food web" increases in complexity **see Appendix A, Section A.3.2**). The generic shown in Figure 6.1 is suitable as a template at most contamination sites but must be modified to include site-specific conditions **as necessary**.

Once the ecological conceptual model is developed, work can commence on developing an ecological work plan (see Modules 9 and 10), the specific sampling program (see Modules 12 and 13), and ecological data needs for the baseline risk assessment (see Module 15).

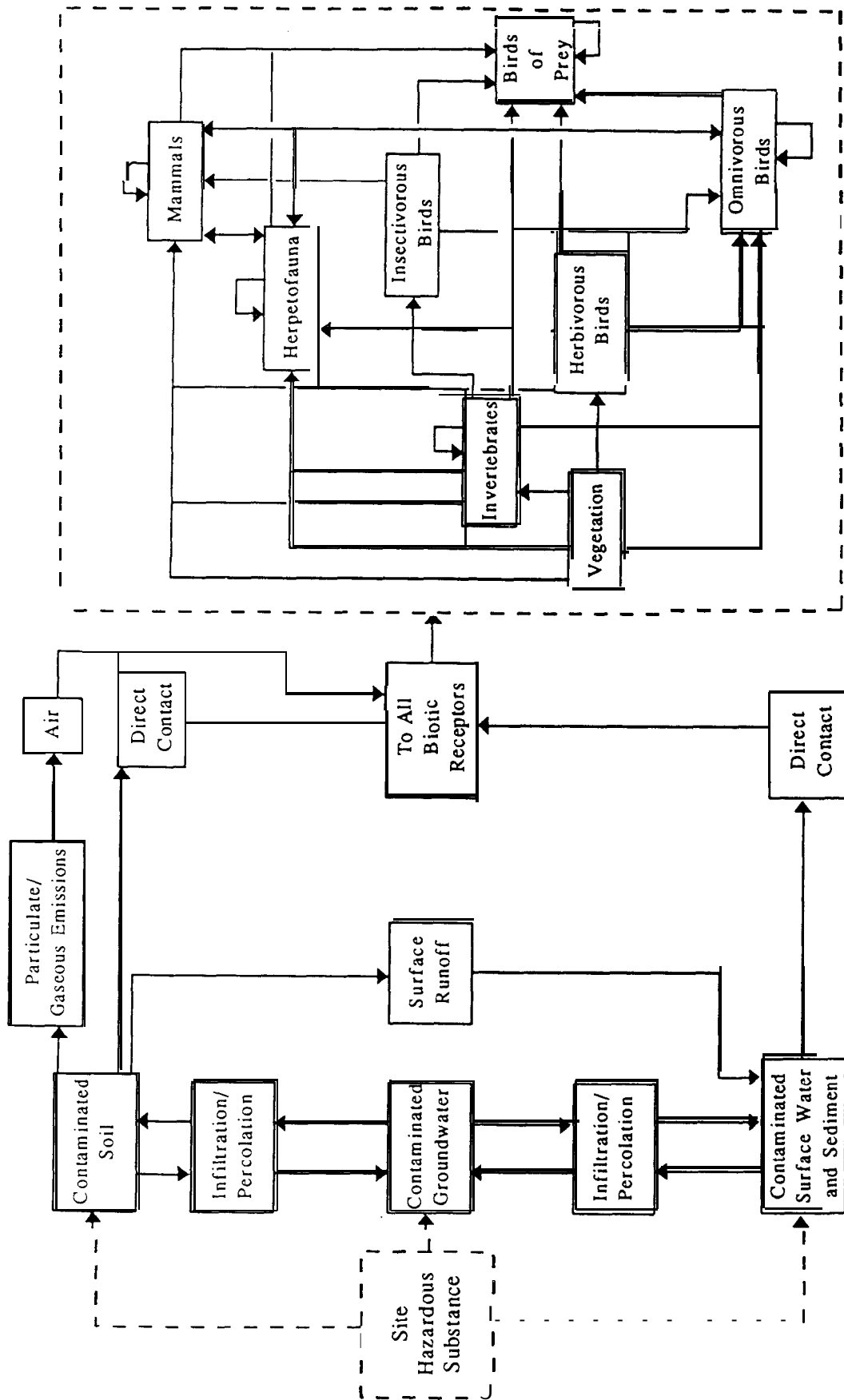


FIGURE 6.1 Example of a Conceptual Site Ecological Model

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